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Approach and intervention in blood pressure abnormalities

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ABSTRACT

Hypertension is when blood pressure (BP) is measured above the limits of what is considered normal. Almost all guidelines define hypertension as a systolic blood pressure (SBP) above 140 mmHg and a diastolic blood pressure (DBP) above 90 mmHg. Blood pressure should not be seen only as a numerical value that should be monitored and lowered when it rises. Blood pressure is an important vital sign that can provide important clues to the clinician about the patient's current condition. Long-term control of hypertension in individuals significantly reduces cardiovascular risk. In the case of hypertensive emergencies or urgent situations, antihypertensive treatment should be initiated after consideration of the approach to the recommendations. Recent observational studies suggest that pharmacologic treatment of acute and asymptomatic in-hospital BP elevations may not be beneficial and may even increase the risk of in-hospital and post-discharge complications. The patient's current clinical status and additional comorbidities should be evaluated, and attention should be paid to contraindications and drug dosage adjustments.

Keywords: Hypertension, systolic blood pressure, diastolic blood pressure

INTRODUCTION

Hypertension is when blood pressure (BP) is measured above the limits of what is considered normal. There continues to be controversy about the blood pressure values that should be considered abnormal. Guidelines define hypertension as a systolic blood pressure (SBP) above 140 mmHg and a diastolic blood pressure (DBP) above 90 mmHg.[1] These abnormal values are expected to be seen in more than one measurement for the diagnosis of hypertension. While long-term control of hypertension in individuals significantly reduces cardiovascular risk, the benefit of controlling acute BP elevations in hospitalized patients is controversial.[2]

In the case of hypertensive emergencies or urgent situations, antihypertensive treatment should be initiated after consideration of the approach to the recommendations. However, current hypertension guidelines do not address in-hospital asymptomatic -BP elevations or recommendations for their diagnosis, management, and follow-up. Recent observational studies suggest that pharmacologic treatment of acute and asymptomatic in-hospital BP elevations may not be beneficial and may even increase the risk of in-hospital and post-discharge complications.[3]

MANAGEMENT OF THE PATIENT WITH HYPERTENSION

Medical Management of Hypertension

On admission to the ward for patients already diagnosed with hypertension and under pharmacologic treatment, it is necessary to assess the patient's current clinical condition and continuation of drug therapy before deciding to continue routine use of the patient's medications. Attention should be paid to drug contraindications and dosage adjustments for the individual's comorbidities and concomitant acute organ dysfunctions. Drugs that are contraindicated due to comorbid conditions and drugs that are considered to be harmful due to comorbid conditions are compiled in Table 1 and Table 2.[4,5]

Table 1. Drug groups contraindicated in the treatment of hypertension due to concomitant conditions

Clinic	Medicines
Grade 2-3 AV block	Beta-blockers, calcium –channel blockers (non-dihydropyridine), reserpine
Depression	Reserpine
Liver disease	Methyldopa
Bronchospastic airway disease	Beta blockers
Pregnancy	ACE inhibitors, angiotensin II receptor antagonists
Hyperkalemia	
Bilateral renal artery stenosis	
Gut	Diuretics

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Table 2. Drugs considered harmful in the treatment of hypertension with concomitant conditions

Comorbidity	Medicines
Kidney failure	Potassium-sparing diuretics
Peripheral vascular disease	Beta blockers
Diabetes mellitus	Beta blockers, high dose diuretics
Gut	Diuretics
Dyslipidemia	Beta blockers, high dose diuretics
Liver disease	Labetalol
Renovascular disease	ACE inhibitors, angiotensin II receptor blockers
Dyslipidemia	Diuretics, beta blockers
Heart failure	Beta blockers (except carvedilol, metoprolol, bisoprolol), calcium antagonists (except amlodipine and felodipine)
Orthostatic hypotension	Alpha blockers

Blood Pressure Monitoring

Blood pressure monitoring can provide many clues about the clinical status of patients on inpatient wards. There is no recommendation in the guidelines regarding the frequency of -BP monitoring in patients followed in the inpatient ward.[5,6] The frequency of this monitoring depends on the clinician's judgment according to the stability of the patient. Studies do not recommend strict BP monitoring in stable patients. Routine BP monitoring, especially at night, is not recommended for stable patients because it may affect sleep quality and increase stress levels.[7]

Increased BP is seen in 50% to 70% of patients followed in inpatient wards, and the majority of these patients are asymptomatic.[8] Patients with BP >140/90 mmHg, with or without a previous diagnosis of hypertension, are considered to have asymptomatic hypertension unless there are findings suggestive of end-organ damage. Aggressive antihypertensive therapy in an asymptomatic patient may result in ischemic events such as acute kidney injury and myocardial damage.[9]

A critical issue related to in-hospital BP elevation is how to measure BP in the hospital. Although automated devices are frequently used in the BP monitoring of clinic inpatients because they are fast and practical in terms of continuous monitoring, when we look at the studies between manual measurement and device measurement, the automatic findings obtained by device measurement cannot be completely trusted, and the manual method should be considered as the reference standard, especially in critical situations.[10] Especially in the case of arrhythmia, the automated device is likely to produce inaccurate results, and manual measurement is absolutely necessary. BP should be measured in both arms at the first measurement and in necessary critical situations.

In addition to the measurement method and errors during measurement, factors contributing to the high prevalence of in-hospital blood pressure elevations include uncontrolled pain, noise, anxiety, and disturbed sleep patterns. Patients already on antihypertensive medication may also have experienced an interruption in their regular doses.[2]

Intervention for Elevated Blood Pressure

Finding elevated BP during inpatient follow-up prompts many clinicians to initiate antihypertensive treatment quickly. Increased BP can inform the physician about many aspects of the patient's clinical course and should not be seen only as a value to be lowered. The treatment and follow-up course should be established by evaluating some parameters.

If increased BP in the inpatient is considered as a spectrum, this spectrum ranges from asymptomatic hypertension to severe hypertension. Classification of BP is important for rapid identification and clinical differentiation of hypertensive crises, triage to an intensive care unit, and determination of the need for oral/intravenous (IV) therapy. The classification of BP in adults is compiled in **Table 3**.[6]

Table 3. Classification of blood pressure

	Systolic (mmHg)	Diastolic (mmHg)
Optimal	<120	<80
Normal	<130	<85
High-Normal	130-139	85-89
Stage 1 Hypertension	140-159	90-99
Stage 2 Hypertension	160-179	100-109
Stage 3 Hypertension	>180	>110

Apart from essential and secondary hypertension, some secondary factors may cause acute elevation of BP in hospitalized patients. These secondary factors include pain, anxiety, hypervolemia, medications, urinary retention, and alcohol withdrawal.6 At this point, it should be kept in mind that the presence of a hypertensive emergency should be evaluated during the approach to patients with hypertensive BP monitoring during routine visits or acute elevations in blood pressure, and if there are no emergency or urgent conditions, the underlying causes should be evaluated by history and physical examination, and treatment should be organized.[11]

Emergencies in the Hypertensive Patient

Approximately 1-2% of patients with hypertension have a hypertensive crisis.[12] In a hypertensive crisis, it is the rate of rise in blood pressure rather than the level of blood pressure that is important.[13] Various triggering events can lead to hypertensive emergencies. Hypertensive crisis is divided into two categories, and this distinction is important for establishing the treatment course.[14]

Hypertensive emergencies: situations where rapid parenteral lowering of blood pressure is essential to prevent target organ damage. Hypertensive emergencies are compiled in Table 4.[14]

Table 4. Hypertensive emergencies

Acute coronary syndromes	Eclampsia
Pulmonary edema	Adrenergic crisis
Acute renal failure	Acute aortic dissection
Serious epistaxis	Serious burns
Acute intracranial event	Severe postoperative hypertension

Hypertensive urgencies: severe elevation of BP in the absence of target organ damage. It is usually recommended to lower blood pressure with oral antihypertensives over a few hours or a few days. Hypertensive urgent conditions are compiled in Table 5.[14]

Table 5. Hypertensive urgencies

Sudden and rapid rise in blood pressure not accompanied by target organ damage
Postoperative blood pressure elevation
Patients with uncontrolled hypertension undergoing emergency surgery
Patients with ischemic heart disease accompanying hypertension

The levels of hypertension that constitute a hypertensive emergency are not universally established, although there are some memorable values. Long-term hypertensive patients can tolerate blood pressure >200/120 mmHg without target organ damage. In some cases, a hypertensive emergency may develop in the presence of lower BP and a sudden rise in BP. As a result, the diagnosis of hypertensive emergency or urgency is based on the clinical presentation of the patient, not on limit values. There is also no threshold value for differentiating between hypertensive emergency and hypertensive urgency. The distinguishing feature here is the identification of end-organ damage.15

Once it has been established that a true hypertensive emergency is present or likely, laboratory tests such as metabolic panels, urinalysis, and cardiac enzymes may be useful. An electrocardiography (ECG) should be performed in every patient with suspected cardiac ischemia. Brain computed tomography (CT) is recommended in patients with acute neurologic complaints or findings on examination. Chest radiography should be performed on patients with shortness of breath. A chest radiograph may also show widening of the mediastinum or aortic dissection, but this is a relatively insensitive marker, and CT angiography of the chest and abdomen should be performed to rule out or confirm dissection.[16,17]

Rapid lowering of BP is the mainstay of treatment for hypertensive emergencies. The aim would be to lower mean arterial pressure by 20% to 25% within the first 1 to 2 hours. Since this rapid reduction is the goal, oral medications have no role in the treatment of a hypertensive emergency. Intravenous vasoactive drops such as labetalol, esmolol, nicardipine, and nitroglycerin are typically effective options. Intravenous drugs that can be used in hypertensive emergencies in Turkey compiled in Table 6.[4,16]

In hypertensive emergencies, the patient should be treated with intensive care. The first drug of choice should be sodium nitroprusside. If the patient has renal insufficiency, continuous infusion of sodium nitroprusside for more than 48-72 hours may cause thiocyanate toxicity. Oral antihypertensive therapy should be adjusted after blood pressure reaches desired levels.[18]

For adults without organ damage, a gradual normalization of blood pressure is recommended. The key feature of management is that the reduction in blood pressure should be gradual over several days if there is no evidence of organ damage. Table 6 shows some of the drugs that can be used in hypertensive emergencies in Turkey, their side effects, and their dosing. Table 7 summarizes some oral medications that can be used in hypertensive urgent situations, their side effects, and dosing.[4,16]

Table 6. Intravenous drugs available in hypertensive emergency in Turkey

Medicine	Dose	Side Effects
Sodium nitroprusside	0.25-10 µg/kg/min infusion	Hypotension, vomiting
Nitroglycerin	5-100 µg/min infusion	Headache, vomiting
Labetalol	20-80 mg bolus, 0.5-2 mg/min infusion	Nausea and vomiting, heart block
Furosemide	40-60 mg bolus	Hypotension
Nicardipine	2-10 mg/hour infusion	Reflex tachycardia
Hydralazine	10-20 mg bolus	

Table 7. Oral drugs available in hypertensive urgency in Turkey

Medicine	Way of delivery	Dose	Cautions to be Considered
Captopril	Sublingual	25-50 mg	Should not be given if renal artery stenosis is present
Amlodipine	Oral	5-10 mg	May cause headaches and reflex tachycardia
Doxazosin	Oral	4-8 mg	May cause dizziness and orthostatic hypotension

Treatments for Specific Hypertensive Emergencies

In the presence of hypertensive encephalopathy, it is recommended to reduce BP by 25% within the first 1 hour and to 160/100 mmHg within 2 to 6 hours; hydralazine should be avoided.[16]

In cases of acute coronary syndrome, it is recommended to reduce SBP to <140 mmHg within 1 hour and

maintain DBP >60 mmHg. Esmolol, nitroglycerin, metoprolol, and labetalol may be preferred; hydralazine should be avoided.[16]

If acute heart failure develops, it is recommended to lower the SBP below 140 mmHg within the first 1 hour. Loop diuretics are necessary in the majority of cases; beta-blockers should be avoided.[16]

If aortic dissection is present, it is recommended to reduce the SBP to <120 mmHg within the first 20 minutes, while at the same time reducing the heart rate to <60 beats/min. The use of both beta-blockers and concomitant vasodilator agents is recommended.[16]

If increased blood pressure is accompanied by a hemorrhagic cerebrovascular event, guidelines recommend regulating SBP to <180 mmHg. Some recent studies and meta-analyses have defined a reduction in SBP to the 130-140 range as safe. Acute lowering of SBP to <130 mmHg is potentially harmful and should be avoided. The patient should be neurologically assessed every 15 minutes while blood pressure is being lowered. Labetalol or nicardipine may be preferred; hydralazine should be avoided.[19]

If an ischemic cerebrovascular event is present, IV thrombolytic therapy should be evaluated. If available, BP should be reduced to below 185/110 mmHg before starting IV thrombolytics, and blood pressure should be maintained below 180/110 mmHg for the first 24 hours after IV thrombolytics. If thrombolytic therapy is not indicated, antihypertensive therapy is recommended if blood pressure is above 220/120 mmHg. BP should not be lowered by more than 15% in the first 24 hours. Antihypertensive treatment is not recommended at blood pressure values below 220/120 mmHg. In ischemic SVO, nicardipine or labetalol may be preferred as antihypertensives. Hydralazine should be avoided.[19]

On the other hand, severe hypertension in pregnancy requires emergency treatment. Pregnant women should be prescribed nifedipine, methyldopa, or labetalol during pregnancy; ACE inhibitors or ARBs should not be given. IV hydralazine or oral nifedipine may be used to lower blood pressure during the acute event.[20]

THINGS TO KEEP IN MIND

Blood pressure should not be seen only as a numerical value that should be monitored and lowered when it rises. Blood pressure is an important vital sign that can provide important clues to the clinician about the patient's current condition.

When encountering increased blood pressure in patients followed in the ward, the priority should be to differentiate hypertensive emergencies by physical examination and history and to prevent target organ damage. If there is a hypertensive emergency, aggressive antihypertensive treatment should be organized in the first hours; otherwise, the treatment route should be created in this direction by focusing on the underlying causes.

While antihypertensive treatment is being organized, the patient's current clinical status and additional comorbidities should be evaluated, and attention should be paid to contraindications and drug dosage adjustments.

CONCLUSION

There is overwhelming evidence of the benefit of identifying and treating hypertension in the community. However, while diagnostic and treatment algorithms exist for hypertensive emergencies in hospitalized patients, little is known about the clinical significance of asymptomatic and short-term blood pressure elevations.

Acutely high BP in hospitalized patients does not always need antihypertensive treatment as long as there are no symptoms or immediate damage to an organ. This is until reliable measurement protocols are created for these patients. There is even the possibility that antihypertensive treatment in these situations may lead to ischemic conditions.

ETHICAL DECLARATIONS

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